

REMARKS/ARGUMENTS

New Claims

New claims 51-55, each reciting that each compound lens consists essentially of two elements, are added. These new claims find support at page 7, lines 22-29 of the specification and in Figure 7; no new matter is added thereby.

Rejection Under 35 U.S.C. § 112

Claims 37-39 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In light of the foregoing amendment of claims 37-39, withdrawal of the §112, second paragraph, rejection of these claims is respectfully requested.

Rejection Under 35 U.S.C. § 103

Claims 1-2, 5, 7 (previously canceled), 10-13, 35-38, 40, 44-47, and 49 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Shimoda, U.S. 6,208,829 ("Shimoda") in view of Sato, U.S. 5,260,587 ("Sato") and Shreeve, GB 2090669 ("Shreeve"). In light of the foregoing amendment and the following remarks, this rejection is respectfully traversed.

Shimoda discloses an image forming apparatus with a printhead that includes an LED exposure array and a lens array focused to expose a photographic paper but does not, by contrast with the applicants' printhead, include an array of uniformizer elements located between the LED and lens arrays. There is no teaching in the reference that the lenses of the lens array, which can focus an image of the same size as the inputted image on a photographic paper (column 3, lines 34-41), are compound lenses having aspheric surfaces. Also as noted in the Office Action, Shimoda does not include a description of a housing for enclosing the LED and lens arrays.

It was acknowledged in the Office Action that Shimoda does not explicitly teach that the sag of any of the aspheric surfaces is less than about 40 microns and the refractive index is greater than about 2.0, but it was asserted that these values could be determined by routine experimentation. On the contrary, as described in detail at page 7, line 17, to page 8, line 4, of the instant specification,

the fabrication of aspheric microlens having high numerical aperture places constraints on the allowable sag of the lens, i.e., less than about 40 microns, and the need for increased light-gathering capability under such constraints requires that the lens be fabricated from material having a high refractive index, i.e., greater than 2. Thus, contrary to the assertion of the Office Action, the sag and refractive index characteristics of the aspheric lenses employed in the applicants' printhead are not determined by routine experimentation.

Sato discloses an optical semiconductor device array module that includes an LED array, an array of lenses to focus the light from the LEDs on predetermined points, and an array of optical fibers positioned to receive the focused light, all of the arrays being contained in a case (column 1, line 56, to column 2, line 2; column 3, lines 24-33) .

As with Shimoda, Sato discloses a device that includes a lens array but contains no teaching or suggestion that this array comprises compound lenses and, more specifically, compound lenses each comprising a plurality of aspheric surfaces. To overcome this major common deficiency of the Shimoda and Sato teachings, Shreeve is cited for its purported disclosure of a plurality of compound lenses that are aspherical converging lenses.

The optical device disclosed in Shreeve, which is intended for use in an electrophotographic apparatus for producing black and white images such as typewritten documents and line drawings (page 1, lines 6-10 and 85-94; page 3, lines 1-6; claims 8-9), includes three arrays of aspherical converging lenses of equal focal length that are separated from one another by honeycomb structures and are located between a movable document table defining an object plane and a rotatable drum carrying an electrostatographic recording element and defining an image plane (page 1, lines 44-61; page 2, lines 72-76).

There is no description in Shreeve of the light source required to illuminate the object. The array of light emitting diode (LED) light sources in the printhead of the present invention does not illuminate an object but rather, as a consequence of modulation by a datafile, generates an object.

The three separate lens arrays of Shreeve provide a 1:1 upright wrong reading image on the recording element (page 2, lines 18-19 and 73-77). By contrast, the printhead of the present invention provides an image of non-unity magnification, preferably of 0.5 X (page 8, lines 4-5). The aspherical lenses

comprising the three separate arrays in the Shreeve device are spaced one from another and serve separate functions as objective lenses, field lenses, and projection lenses (page 1, lines 23-25 and 56-61). The individual lenses depicted in Figures 3 and 3a are biconvex simple lenses, and the individual lens in Figure 4 is a monoconvex simple lens. Figure 7 of the instant application, by contrast, depicts a compound lens 38 that comprises two elements 42 and 44 having aspheric surfaces.

In contrast to the device disclosed in Shreeve, which is intended for electrostatographic black and white imaging, the printhead of the present invention is capable of producing full color images on a photosensitive medium (page 9, lines 15-18). Printhead 10 includes a single lens array 28 that is disposed between an LED light source array 20 and photosensitive medium 22 and comprises a plurality of compound lenses 38, each comprising a plurality of aspheric surfaces.

It is clear from the foregoing discussion that the teachings of Shimoda, Sato, and Shreeve are not properly combinable to render obvious the present invention, as defined by claims 1-2, 5, 7 (previously canceled), 10-13, 35-38, 40, 44-47, and 49. Withdrawal of the §103(a) rejection of these claims is respectfully requested.

Claims 3-4, 6, 15, 39, 41, 43, 48, and 50 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Shimoda in view of Sato and Shreeve, as applied to claims 1, 37, 40, and 45 above, and further in view of Pilossof et al., WO 02/47915 ("Pilossof"). In light of the following remarks, this rejection is respectfully traversed.

The disclosures of Shimoda, Sato, and Shreeve have been extensively discussed above. Pilossof, which discloses an optical imaging head containing an LED array, is relied on for its teaching of a micro light pipe array that can be configured either as hollow light pipes with internal walls coated with a highly reflective coating or as optical fibers. However the reference contains no teaching of an array comprising compound lenses and, more specifically, compound lenses each comprising a plurality of aspheric surfaces. To the contrary, the imaging head of Pilossof includes either a single cylindrical anamorphic imaging lens or a combination of an anamorphic lens and a focusing

lens array (Figures 2a and 3a), which can be combined into a single lenslet array of anamorphic elements (page 13, lines 15-16).

Therefore the teachings of Shimoda, Sato, Shreeve, and Pilossof in combination fail to render obvious the present invention, as defined by claims 3-4, 6, 15, 39, 41, 43, 48, and 50. Withdrawal of the §103(a) rejection of these claims is respectfully requested.

Claims 1, 14, 16-22, 24-25, 28-29, and 31-34 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Harrigan et al., U.S. 5,212,500 ("Harrigan") in view of Shimoda and Shreeve. In light of the following remarks, this rejection is respectfully traversed.

Harrigan discloses a color proofing apparatus that includes a light source comprising a plurality of laser diodes and a printhead that is mounted on a translator member adjacent to a drum for transporting thermal print media. The printhead includes a cylindrical housing containing a linear array of optical fibers that extend from the laser diodes. Light from the diodes passes through a lens assembly that consists of a stationary lens and a movable lens. As acknowledged in the Office Action, Harrigan fails to teach a lens assembly comprising a lens array arranged in a single correspondence with the laser diodes and optical fibers.

The deficiencies in the disclosures of Shimoda and Shreeve as discussed above are not remedied by the disclosure of Harrigan. Therefore the teachings of these three references are not properly combinable to render obvious the present invention, as defined by claims 1, 14, 16-22, 24-25, 28-29, and 31-34. Withdrawal of the §103(a) rejection of these claims is respectfully requested.

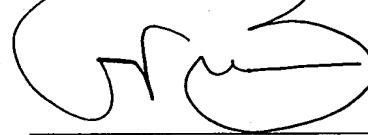
Claim 23 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Harrigan in view of Shimoda and Shreeve, as applied to claim 16 above, and further in view of Pilossof. The disclosures of Harrigan, Shimoda, Shreeve, and Pilossof have all been extensively discussed above. In light of the preceding discussion, it is clear that the teachings of these references in combination fail to render obvious the present invention, as defined by claim 23. Withdrawal of the §103(a) rejection of claim 23 is respectfully requested.

The Office Action mailed January 6, 2006 included no explicit rejection of either claim 9 or claim 30. On the presumption that these claims contain allowable subject matter, claim 9 and claim 30 are each amended into independent form by including the limitations of, respectively, claims 1 and 16.

The recent Office Action also included no explicit rejection of independent claim 40, indicating that this claim is allowable.

Claims 1-6, 9-25, and 28-55 are now in this case, whose prompt allowance is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "N. Blish". It is enclosed in an oval border.

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